

SEP 18 2007

REMARKS

The enclosed is responsive to the Examiner's Office Action mailed on June 15, 2007. At the time the Examiner mailed the Office Action claims 1-18 and 30-43, were pending. By way of the present response Applicants have: 1) amended no claims; and 2) added no claims; and 3) canceled no claims. As such, claims 1-18 and 30-43 are now pending. Applicants thank the Examiner for the telephonic interview held on 9-14-2007. At the interview were Examiner Cathy Lam and Applicants' representative Neal Berezny, Reg. No. 56,030. Discussed at the interview were the Arnaud and Larson references and claims 1, 5, and 41. No agreement had been reached. Applicants respectfully request reconsideration of the present application and allowance of all claims now presented.

35 U.S.C. § 112 Rejections

Claim 41 is rejected under 35 U.S.C. §112, sixth paragraph, as it involves phrases "means for..." are unclear as to what are these "means" are referring to.

MPEP 2181, section II, identifies that "35 USC 112, sixth paragraph states that a claim limitation expressed in mean-plus-function language "shall be construed to cover the corresponding structure ...described in the specification and equivalents thereof." Applicants assert that the following, set forth in the specification, provide an adequate disclosure showing what is meant by the language of claim 41.

"A means for coupling a heat generating component to a carrier substrate" relates to various embodiments found at least in paragraphs [2], [16], [18], [19], and [26], which include but are not limited to printed circuit boards having integrated circuits, interconnect lines, ground planes, and power planes. Also included are various types of substrates, such as, motherboards, daughter cards, controller boards, video adapters, and network interface

cards. Further, one or more electrical components may be coupled to the signal layer, such as, processors, chipsets, and voltage regulation components.

"A means for producing a visible change of the thermochromatic layer" relates to various embodiments found at least in paragraphs [25], [26], [29], and [30], and figures 3A to 3B, and figure 6, which include but are not limited to changing the color of the visible surface from a first color to a second color thermochromatically, wherein the first color may be from the color of the thermochromatic material, the color of solder mask layer, or the color of any other layer of the PCB not covered by an opaque surface or material. In one embodiment, the visible surface may be the result of leucodye or NIPAM disposed over the solder mask layer, wherein as the temperature of the PCB increases to the activation temperature, the visible surface becomes transparent to reveal a marking printed on the solder mask layer, such as the label "HOT". In embodiments, the visible surface may be the top layer of the solder mask layer or other exposed layers on the PCB. In various embodiments, the thermochromatic material may be disposed near the carrier substrate, and may be above the solder mask layer, or below the solder mask layer, or formulated within the solder mask layer. In embodiments, the thermochromatic material may be part of the visible surface of the carrier substrate. In embodiments, the thermochromatic material may change to a transparent state, thus revealing underlying colors, markings, or labels below the thermochromatic material.

"A means for observing" relates to various embodiments found at least in paragraphs [25], [26], and [17], and figures 2A to 2B, which include but are not limited to changing the color of the visible surface from a first color to a second color thermochromatically, wherein the first color may be from the color of the thermochromatic material, the color of solder mask layer, or the color of any other layer of the PCB not covered by an opaque surface or material. In one embodiment, as the temperature of the PCB increases to the activation

temperature, the visible surface becomes transparent to reveal a marking printed on the solder mask layer, such as the label "HOT". In embodiments, the visible surface may be the top layer of the solder mask layer or other exposed layers on the PCB. In various embodiments, the thermochromatic material may be disposed near the carrier substrate, and may be above the solder mask layer, or below the solder mask layer, or formulated within the solder mask layer. In embodiments, the thermochromatic material may be part of the visible surface of the carrier substrate. In embodiments, the thermochromatic material may change to a transparent state, thus revealing underlying colors, markings, or labels below the thermochromatic material. In embodiments, the PCB may be coated with a layer or multiple layers of thermochromatic materials, wherein if the temperature of the PCB rises above the activation temperature of the thermochromatic materials, the thermochromatic material may change from a first color to a second color, thus providing an observable visible change in color, which may comprise a marking or label, or the thermochromatic material may become transparent revealing an observable visible change in color or marking or label in an underlying layer.

Applicants, accordingly, respectfully requests withdrawal of the rejections of claim 41 under 35 U.S.C. § 112.

Claim 42 is rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Applicant traverse the rejection. Claim 42 depends upon claim 41, which comprises means-plus-function language. MPEP 2181, section III, states that to determine if the applicant has complied with the requirements of 35 USC 112, second paragraph, when 35 USC 112, sixth paragraph, is invoked: the corresponding structure, ... described in the

specification in specific terms and one skilled in the art could identify the structure, ... from the description, then the requirements of 35 USC 112, second and sixth paragraphs are satisfied. See *Atmel*, 198 F.3d at 1382, 53 USPQ2d 1231.

At least figures 1, 4, and 5, provide embodiments of claim 42, wherein the thermochromatic layer is **above** the heat generating component, and wherein the solder mask layer is disposed **above** the signal layer. Further support may be found at least in paragraphs [25], [26], [29], and [30], and figures 3A to 3B, and figure 6. In embodiments, the visible surface may be the top layer of the solder mask layer or other exposed layers on the PCB. In various embodiments, the thermochromatic material may be disposed near the carrier substrate, and may be above the solder mask layer, or below the solder mask layer, or formulated within the solder mask layer. In embodiments, the thermochromatic material may be part of the visible surface of the carrier substrate. In embodiments, the thermochromatic material may change to a transparent state, thus revealing underlying colors, markings, or labels below the thermochromatic material.

The above provides various embodiments of claim 42 that are fully and clearly supported in the specification in specific terms and in which the structure can easily and clearly be identified by an ordinary artisan.

Applicant, accordingly, respectfully requests withdrawal of the rejections of claim 42 under 35 U.S.C. § 112.

35 U.S.C. § 102(e) and 35 U.S.C. § 102(b) Rejections

Claims 1, 2, 9, 30-31, 34, 41 and 43 have been rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,872,453 to Arnaud et al. (hereinafter "Arnaud").

Claim 1 relates to a carrier substrate having a visible surface and a heat generating component coupled to the carrier substrate; and a thermochromatic material having an activation temperature, disposed adjacent to the carrier substrate, wherein the thermochromatic material produces a visual change of the visible surface when the activation temperature of the thermochromatic material is reached, wherein the carrier substrate coupled to the heat generating component comprises normal operating temperatures when the carrier substrate and heat generating component operate normally, and wherein the **thermochromatic material is selected to have its activation temperature above the normal operating temperatures of the carrier substrate coupled to the heat generating component.**

In contrast, Arnaud discloses a thermochromatic material coating for a solar panel, which switches on to block the sun when the thermochromatic material exceeds room temperature. However, Arnaud fails to disclose or suggest all the elements of amended independent claim 1. Arnaud at least fails to disclose or suggest that the **thermochromatic material is selected to have its activation temperature above the normal operating temperatures of the carrier substrate, and that the carrier substrate is coupled to the heat generating component.** Arnaud fails to disclose or suggest any components coupled to the carrier substrate, much less any heat generating components. As previously identified, the rejection fails to specifically identify any disclosure or suggestion that addresses the limitation that **"the thermochromatic material is selected to have its activation temperature above the normal operating temperatures of the carrier substrate**

coupled to the heat generating component.” Instead, in the Office Action mailed 6/15/07, in the Response to Arguments section, the Examiner concludes that “Arnaud’s thermochromatic layer can be set (or adjusted) depending on the operating temperature” and that “The three prior art clearly teach their thermochromatic materials are thermally response and that the thermochromatic materials would have some visual affect when the conductive layer reached a certain temperature.”

Thermochromatic materials are specifically engineered and designed to have a very specific activation temperature. This is achieved by selecting a type of thermochromatic material and then physically and/or chemically modifying the material to achieve a very specific activation temperature. Paragraphs [20] to [22] of the specifications disclose several **chemical and physical** mechanisms to design and engineer thermochromatic materials to **different activation temperatures** by physical and/or chemical modifications. Selecting a specific activation temperature for a thermochromatic material further limits the thermochromatic material to a subset having very specific physical and/or chemical properties that differ from those thermochromatic materials having different activation temperatures from the selected activation temperature.

Furthermore, even assuming that the Examiner’s assessment is correct that the prior art discloses in combination that (1) the thermochromatic material is thermally responsive, and (2) that the thermochromatic material would have some visual effect, and (3) that the visual effect would occur **at a certain temperature**, there is still absolutely no disclosure or suggestion that the “certain temperature” is

above the normal operating temperatures of the carrier substrate coupled to the heat generating components.

The following requirements for a 35 USC 102 rejection were extracted from the MPEP 2131:

To anticipate a Claim, the reference must teach **EVERY ELEMENT** of the Claim. "A claim is anticipated only if each and every element as set forth in the **claim** is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. V. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

Arnaud at least fails to disclose or suggest any heat generating components coupled to the carrier substrate. Further, the problem being solved by Arnaud is to form a thermochromatic coating on panels that are transparent, such as windows on homes, thus allowing sunlight in, until the activation temperature of the thermochromatic film is reached, at which point the thermochromatic film becomes opaque or reflective, thus blocking out the sun. Therefore, the issue being posed by applicant is what is the "normal operating temperature" of the alleged "carrier substrate" in Arnaud? Applicant asserts that for the device in Arnaud, in order to operate normally, it will need to turn on and stay on to block out the sun at very high temperatures and turn off and stay off at very cool temperatures to let in the sun. Therefore, the range of normal operating temperatures would go from very hot temperatures to very cold temperatures, wherein the activation temperature appears to be just above room temperature, and thus well within the range of normal operating temperatures of the Arnaud device. Therefore, Arnaud fails to disclose or

suggest an activation temperature above the normal operating temperatures of the device.

In fact, Arnaud teaches away from claim 1 and modifying Arnaud to read on claim 1 would clearly render the Arnaud device inoperable for its intended purpose. Clearly, the Arnaud device desires to operate within a wide range of extreme temperatures to be of greatest value. For example, if the Arnaud device were to fracture or melt or becomes damaged at moderate temperatures, its uses and value would be limited. It is desirable for the Arnaud device to operate at very high and very low temperatures, where the need to block out the sun or let the sun in is most desirable. Therefore, modifying the Arnaud device by using a different thermochromatic film having an activation temperature above the desired normal operating temperatures of the device would likely render the modified device essentially useless, at least until the device fails due to the extreme temperatures, at which point the activation temperature is reached and the thermochromatic film turns on when the device is damaged and no longer functioning properly or normally. In fact, in Arnaud, column 1, lines 16-18, Arnaud discloses that it is desirable to lower the prior art activation temperature of 70°C to that closer to room temperature of 25 to 55°C, thus teaching away from claim 1, which requires using a thermochromatic material having an activation temperature above the normal operating temperatures of the device, which would clearly be well above room temperature.

Arnaud also suffers from being of non-analogous art to that of claim 1 because they are drawn to solving very different problems. Claim 1 relates to a diagnostic tool, in which if the device should operate properly and the carrier

substrate would never reach the activation temperature of the thermochromatic film. In contrast, Arnaud, as well as all the prior art of record, differ from claim 1 in that they are applying an application of a thermochromatic film in their respective devices to allegedly improve the performance and **operation** of the device, and thus, require the thermochromatic film to be constantly activated at a temperature within or below the normal operating temperatures of the device. All the prior art of record have incorporated thermochromatic films into their devices to become a part of the normal operations of the devices, whereas, claim 1 relates to incorporating the thermochromatic film into the device for identifying abnormal operations of the devices, i.e. diagnostics.

In view of the above remarks, a specific discussion of the dependent claims is considered to be unnecessary. Therefore, Applicants' silence regarding any dependent claim is not to be interpreted as agreement with, or acquiescence to, the rejection of such claim or as waiving any argument regarding that claim. Nonetheless, the following remarks regarding the Examiner's rejections and the amended claims may be helpful to expedite prosecution.

The rejection asserts that a conductive layer **resembles** a printed circuit board. However, a 102 rejection requires that every element be disclosed or suggested. MPEP 2112 (IV) requires that the Examiner must provide rationale or evidence tending to show inherency. "To establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is **necessarily present** in the thing described in the reference." *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d

1949, 1950-51 (Fed. Cir. 1999). Applicants assert that it is not necessarily present in Arnaud that the conductive layer constitute a printed circuit board.

Applicant, accordingly, respectfully requests withdrawal of the rejections of claims 1, 2, 9, 30-31, 34, 41 and 43 under 35 U.S.C. § 102(b) as being anticipated by "Arnaud".

Claims 1-2, 6, 9, 30-31, 34, 41 and 43 have been rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,229,514 to Larson (hereinafter "Larson").

In light of the above remarks, Larson also fails to disclose or suggest all the elements of the independent claims, and actually teaches away from the invention. Larson discloses a display device consisting of electrodes on a substrate, which **when operational** become heated so as to raise the temperature of the thermochromic material at least to its activation temperature. For the device to operate normally the electrode's normal operating temperature must be **at least equal to or above** the activation temperature of the thermochromic material in order for the display device to operate, and thus does not read on claim 1. If the activation temperature was **above the normal operating temperatures**, then the thermochromatic material would not turn on during normal operation and the display would not function, rendering the modification **inoperable**. Therefore, the activation temperature of the thermochronic material is **below** the electrode's normal operating temperatures, and thus teaches away from the invention.

Larson fails to disclose or suggest all the limitations of the claim, thus the 102 rejection is improper.

In view of the above remarks, a specific discussion of the dependent claims is

considered to be unnecessary. Therefore, Applicants' silence regarding any dependent claim is not to be interpreted as agreement with, or acquiescence to, the rejection of such claim or as waiving any argument regarding that claim.

Applicant, accordingly, respectfully requests withdrawal of the rejections of claims 11-2, 6, 9, 30-31, 34, 41 and 43 under 35 U.S.C. § 102(b) as being anticipated by "Larson".

Claims 1-3, 6, 9-13 and 17-18, 30-31, 38 and 41-43 have been rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,922,242 to Parker (hereinafter "Parker").

In light of the above remarks, Parker also fails to disclose or suggest all the elements of the independent claims and teaches away from the invention. Parker discloses a display device having a thermochromatic material and a resistive element, which achieves a temperature **above** the **activation** temperature of the thermochromatic material and changes it from opaque to transparent, see abstract. Parker requires that the activation temperature be **below** at least some of the **normal operating temperatures** in order for the display device to turn on and function. Independent claims 1, 10, 30, and 41, all require that the activation temperature be **above** the normal operating temperatures of the carrier substrate coupled to heat generating components. Thus, Parker fails to disclose or suggest all the limitations of the claims.

In view of the above remarks, a specific discussion of the dependent claims is considered to be unnecessary. Therefore, Applicants' silence regarding any dependent claim is not to be interpreted as agreement with, or acquiescence to, the

rejection of such claim or as waiving any argument regarding that claim.

Applicant, accordingly, respectfully requests withdrawal of the rejections of claims 1-3, 6, 9-13 and 17-18, 30-31, 38 and 41-43 under 35 U.S.C. § 102(b) as being anticipated by "Parker".

35 U.S.C. § 103(a) Rejections

Claims 1-18 and 30-40 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Parker or Arnaud or Larson in view of U.S. Patent No. 6,880,396 to Rait (hereinafter "Rait").

Rait fails to remedy the deficiencies of Parker, Arnaud, and Larson discussed above. Rait discloses a level indicator device, which fails to disclose or suggest all the limitations of the independent claims and teaches away from the invention. The level indicator is operational when the activation temperature of the thermochromatic material is below at least some of the operating temperatures of the liquid level indicator in order to detect the liquid level, and thus, does not read on the claims.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to **modify the reference** or to combine reference teachings. Second, there must be a reasonable **expectation of success**. Finally, the prior art reference (or references when combined) must teach or suggest **all the claim limitations**. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). See MPEP § 2143 - § 2143.03 for decisions pertinent to each of these criteria.

The 103 rejection and all the prior art of record fail to disclose or suggest at least all the limitations of the independent claims, as described above, and many of the limitations of the dependent claims, including but not limited to claims 34-40. Further, all the prior art of record fails to provide a reasonable expectation of success, since they all teach away from using a thermochromatic material having an activation temperature above the **normal operating temperatures** of the devices disclosed in the references. Further, the rejection fails to provided a motivation for each of the alternative rejections. As discussed above modifying the primary references to overcome the above described deficiencies, results in an inoperable device, in all cases.

All the cited references, either singularly or in combination, fail to disclose or suggest wherein the **thermochromatic material is selected to have its activation temperature above the normal operating temperatures of the carrier substrate coupled to the heat generating component**. In response to the Examiner's arguments regarding attacking the references individually, where the rejection is based on the combination of references, applicant refer to the following:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The

teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). See MPEP § 2143 - § 2143.03 for decisions pertinent to each of these criteria.

First, the rejection has failed to produce any references that disclose or suggest the above limitations. Second, all the references cited teach away from claim 1 and become inoperable when modified. And third, there is no motivation to combine in such a way as to form the device related to claim 1. Combining the cited references fails to remedy the deficiencies of the individual references.

Applicant, accordingly, respectfully requests withdrawal of the rejections of claims 1-18 and 30-40 under 35 U.S.C. § 103(a) as being unpatentable over "Parker" or "Arnaud" or "Larson" in view of "Ralt".

CONCLUSION


Applicant respectfully submits that the present application is in condition for allowance. If the Examiner believes a telephone conference would expedite or assist in the allowance of the present application, the Examiner is invited to call Mr. Neal Berezny at (408) 720-8300 or Mr. Michael A. Bernadicon at (408) 720-8300.

Pursuant to 37 C.F.R. 1.136(a)(3), applicant(s) hereby request and authorize the U.S. Patent and Trademark Office to (1) treat any concurrent or future reply that requires a petition for extension of time as incorporating a petition for extension of time for the appropriate length of time and (2) charge all required fees, including extension of time fees and fees under 37 C.F.R. 1.16 and 1.17, to Deposit Account No. 02-2666.

Respectfully submitted,

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Dated: September 17, 2007


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